

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A reactor suitable for mixing and reacting a fuel and an oxidant, comprising:
 - a reactor body having a longitudinal axis;
 - a pressure relief device in fluid communication with said reactor body;
 - an inlet chamber comprising a reactant inlet; a lower end connected to said reactor body;
and an upper end connected to said pressure relief device, and said inlet chamber
having a ~~central~~ longitudinal axis aligned with the longitudinal axis of said reactor body; and
 - a mixing section connected to said inlet chamber at said reactant inlet, and said mixing
section having a central longitudinal axis at an angle of less than 90° to the
longitudinal axis of said inlet chamber, wherein said mixing section comprises:
 - an oxidant inlet adapted to inject a stream of oxidant into said mixing section along the longitudinal axis of the mixing-section; and
 - a fuel inlet adapted to inject a stream of fuel into said mixing section such that the stream of fuel flows tangentially to the stream of oxidant and mixes with said oxidant stream as the streams travel downstream in said mixing section to
form a reactant stream,wherein the angle between the longitudinal axis of the mixing section and the longitudinal axis of the inlet chamber is such that the reactant stream which exits the mixing section and enters the inlet chamber at the reactant inlet flows towards the lower end of said inlet chamber.
2. (Canceled)
3. (Currently amended) The reactor of claim 1 wherein the angle between the ~~central~~

longitudinal axis of the mixing section and the longitudinal axis of the inlet chamber is between 30° and 60°.

4. (Currently amended) The reactor of claim 1 further comprising a mixing device disposed within said mixing ~~chamber~~ section, wherein said mixing device comprises one or more spiral members, a mixing plate or a secondary flow conditioner, said flow conditioner comprising a permeable mixing material having a plurality of interstitial pathways.

5-6. (Canceled)

7. (Currently amended) The reactor of claim ~~[[6]]~~ 1 wherein said pressure relief device has a central axis aligned with the longitudinal axis of said reactor body.

8. (Canceled)

9. (Currently amended) A mixing device for supplying a mixture of a fuel and an oxidant to a partial oxidation reactor, the device comprising:

a pressure relief device;

a tubular reactor inlet chamber having a lower end connected to ~~the~~ a reactor inlet and an upper end having an outlet in fluid communication to said a pressure relief device, said tubular reactor inlet chamber further comprising a reactant gas inlet located at a distance from the lower end of the tubular inlet chamber of at least twice the diameter of the tubular inlet chamber;

a tubular mixing section connected to said reactor inlet chamber at ~~a~~ said reactant gas inlet, wherein the longitudinal axis of said mixing section is at an angle less than 90° to the longitudinal axis of said inlet chamber, wherein the mixing section and the inlet chamber are arranged in such a manner to provide a substantially unobstructed path between the reactor inlet and the pressure relief device;

an oxidant axial inlet adapted to inject the oxidant into said mixing section along the longitudinal axis of said mixing section; and

a fuel inlet adapted to inject the fuel into an annular area located in said mixing section

between the oxidant axial inlet and the inside wall of the tubular mixing section, wherein the angle between the longitudinal axis of the mixing section and the longitudinal axis of the inlet chamber is such that the fuel and oxidant exiting the mixing section and entering the inlet chamber at the reactant gas inlet flow towards the lower end of said inlet chamber.

10. (Currently amended) The mixing device of claim 9 wherein said fuel inlet ~~injects~~ is adapted to inject the fuel tangentially to the axial inlet.
11. (Currently amended) The mixing device of claim 9 wherein said fuel inlet ~~injects~~ is adapted to inject the fuel parallel to the axial inlet.
12. (Canceled)
13. (Original) The mixing device of claim 9 wherein the angle between the longitudinal axis of the mixing section and the longitudinal axis of the inlet chamber is between 30° and 60°.
14. (Original) The mixing device of claim 9 wherein said reactor inlet chamber is substantially free of obstructions between the lower end and the upper end.
15. (Currently amended) The mixing device of claim 9 further comprising a flow conditioner disposed within said mixing section between the reactant gas inlet of said inlet ~~section~~ chamber and said oxidant axial inlet.
16. (Currently amended) The mixing device of claim 15 wherein said flow conditioner ~~further comprises a permeable mixing material comprising~~ selected from the group consisting of ceramic beads, ceramic foam and packing saddles.
- 17-21. (Canceled)
22. (New) The reactor of claim 1 further comprising a means for injecting a sweep gas in the area of the inlet chamber located between the reactant inlet and the pressure relief device.

23. (New) The reactor of claim 1 wherein the inlet chamber is tubular, and the reactant inlet is located at a distance from the lower end of the inlet chamber of at least twice the diameter of the tubular inlet chamber.
24. (New) The reactor of claim 1 further comprising a secondary flow conditioner disposed within said mixing section between the fuel inlet and the reactant inlet, said flow conditioner comprising a permeable mixing material selected from the group consisting of ceramic beads, ceramic foam and packing saddles.
25. (New) The reactor of claim 4 wherein said flow conditioner is located in the downstream end of said mixing section.
26. (New) The reactor of claim 1 wherein the reactor comprises multiple mixing sections.
27. (New) The mixing device of claim 11 wherein the oxidant axial inlet and fuel inlets are arranged in said mixing section in such a manner that the oxidant and the fuel mix once they enter the inlet chamber at the reactant gas inlet.
28. (New) The mixing device of claim 11 wherein the fuel inlet comprises one or more spirals wrapped around the oxidant axial inlet in such a manner to impart the fuel a swirling motion as the fuel passes through the fuel inlet and enters the inlet chamber, said swirling motion of the fuel causing the oxidant and fuel to mix once they enter the inlet chamber at the reactant inlet.
29. (New) The mixing device of claim 11 wherein the mixing section further comprises a mixing plate having a plurality of orifices, said mixing plate being disposed in the mixing section and positioned in such a manner to allow free flow of the oxidant therethrough and to interrupt the flow of the fuel by said plurality of orifices in order to create a turbulent flow in the fuel as the fuel moves out of the mixing section into the inlet chamber.
30. (New) The mixing device of claim 9 wherein the inlet chamber further includes a sweep gas inlet, said sweep gas inlet being adapted to inject a sweep gas in the area of the mixing

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chamber located between the reactant gas inlet and the outlet.

31. (New) The mixing device of claim 9 wherein the inlet chamber further comprises additional mixing equipment disposed at or close to the inner wall of the inlet chamber in the area of the inlet chamber located between the reactant gas inlet and the reactor inlet so as not to interfere with the unobstructed path between the reactor inlet and the pressure relief device.